**UNITED STATES DEPARTMENT OF COMMERCE**
**National Oceanic and Atmospheric Administration**
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, WA 98115

OCT 11 2002

MEMORANDUM FOR: The Record
Permit 1094 Files
Upper Columbia River Steelhead (HIF File Code 8.1.1)
Consultation Number: F/NWR/2002/01236

FROM: for D. Robert Lohn
Regional Administrator

SUBJECT: Biological Opinion on the National Marine Fisheries Service (NOAA Fisheries) proposed amendment to section 10(a)(1)(A) permit 1094 to the Washington Department of Fish and Wildlife (WDFW) to conduct enhancement activities on Upper Columbia River (UCR) steelhead in the UCR Basin

The attached document constitutes the NOAA Fisheries biological opinion based on our review of our proposed amendment of Endangered Species Act (ESA) section 10(a)(1)(A) permit number 1094 to the WDFW to conduct research and enhancement activities on UCR steelhead in the UCR basin. This opinion has been prepared in accordance with section 7 of the ESA of 1973, as amended (16 U.S.C. 1531 et seq.), and is based on information provided for the permit amendment by WDFW, published and unpublished scientific information on the biology and ecology of threatened and endangered salmonids in the Pacific Northwest, and other sources of information. A complete administrative record of this consultation is on file with NOAA Fisheries, Northwest Regional Office, Sustainable Fisheries Division, Seattle, Washington.

Endangered Species Act
Section 7 Reinitiation of Consultation
and
Magnuson-Stevens Act
Essential Fish Habitat Consultation

# BIOLOGICAL OPINION

## Issuance of Amendment #1 to Permit 1094 – Washington Department of Fish and Wildlife's Section 10(a)(1)(A) Research and Enhancement Permit for the Hatchery Steelhead Artificial Propagation Program in the Upper Columbia River Steelhead ESU

Action Agency : National Marine Fisheries Service,
Northwest Region

Date: _____

Consultation #: F/NWR/2002/01236

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# 1.0 Consultation History

The National Marine Fisheries Service (NOAA Fisheries) issued a research and enhancement permit to the Washington Department of Fish and Wildlife (WDFW) under section 10(a)(1)(A) of the Endangered Species Act (ESA) for its activities related to carrying out an experimental program to determine whether hatcheries can assist in boosting steelhead production in Upper Columbia River streams. The Upper Columbia River (UCR) steelhead Evolutionarily Significant Unit (ESU) is listed as an endangered species (August 18, 1997; 62 FR 43937). Permit #1094 was issued to WDFW on February 4, 1998, and remains in effect through May 31, 2003. A section 7 Biological Opinion (NMFS 1998a) and NEPA Environmental Assessment and Finding of No Significant Impact (NMFS 1998b) were part of NOAA Fisheries' action of issuing the section 10 permit.

The WDFW subsequently applied for three modifications to permit 1094. NOAA Fisheries issued modification 1 in response to WDFW's request to include authorization of incidental take of spring chinook, additional measures to enhance WDFW's ability to manage adult returns, and a one-time-only increase in authorized hatchery releases effective in 2001 because of unusual conditions on 2001. Modification 2 was WDFW's request for authorization of take of ESA-listed species associated with a radiotelemetry study – this modification was issued as Modification 3 to research permit #1114 (July 25, 2001; 66 FR 38641). Modification 3 of permit 1094 was WDFW's request for an increase in take of listed steelhead as part of study of potential hatchery-origin fish survival benefits at Wells Hatchery (May 13, 1999; 64 FR 25873).

NOAA Fisheries has initiated this amendment (#1) because of special circumstances related to high steelhead returns in September and October of 2002. To address the need to manage the return of hatchery steelhead consistent with the enhancement program, NOAA Fisheries is considering amending permit 1094. The unusual circumstances observed in 2001 and now in 2002 of unexpected high survival and return of UCR steelhead necessitate this amendment to provide a means by which the large number of hatchery reared steelhead adults can be managed to minimize adverse impacts to the naturally produced listed steelhead. The 2002 run of natural origin steelhead over Priest Rapids Dam as of September 19, 2002, was estimated at 3,848 (Art Viola, WDFW, personal communication). This is an improvement from the ten year average of 1,630. The hatchery component of the run is also predicted to be high at 15,390. The WDFW has provided additional information in support of this amendment, including a revised management plan, 2002 run estimates, and a harvest monitoring plan to allow refined management of adult returns (Koenings 2001; Leland 2002a, b). The activities to be addressed in this amended permit (1) continuation of returning adult hatchery steelhead management activities addressed in the previous modification, (2) conducting a recreational harvest in the mainstem Columbia River above Rocky Reach Dam, (3) removing hatchery steelhead in excess of broodstock and supplementation needs using a selective gear fishery in the Methow River, and (4) monitoring of recreational fisheries. The activities addressed in this amendment are similar to those that underwent public review (opened August 1, 2002; 67 FR 49906) and a public meeting was held in Wenatchee, Washington, on August 27, 2002, to inform the public of

proposed activities. The public comments received generally express support for the activities proposed.

NOAA Fisheries is reinitiating consultation with itself on permit 1094 to consider amending permit 1094 to allow for these additional activities and associated conditions only until May 2003, and to consider their impacts on ESA-listed UCR spring-run chinook salmon. Because spring chinook were not listed at the time the original permit was issued, effects on ESA-listed UCR spring-run chinook salmon were not addressed by the original opinion. It is likely, based particularly on information from WDFW (1999), that some small numbers of spring chinook are taken as a result of other broodstock collection and release activities described in the permit. Impacts on spring chinook of those other activities are not addressed in the current analysis and proposed amendment.

The WDFW has applied for a new permit for the enhancement of UCR steelhead using artificial propagation programs which includes the management of the adult returns from the enhancement programs. This new permit process is underway and was applied for jointly by WDFW, Chelan County Public Utilities District and Douglas County Public Utilities District as part of three Habitat Conservation Plans (HCPs) that were negotiated over the last nine years. The new permit is anticipated to be in place by the time the current permit (1094) expires in May of 2003. As part of that process, NOAA Fisheries will comprehensively evaluate all effects of the proposed activities on listed salmon and steelhead.

# 2.0 Proposed Action

## 2.1 Description of the Action

The proposed action is NOAA Fisheries' amendment of section 10(a)(1)(A) permit 1094 to include the following activities as requested by WDFW and modification 1 the following additional conditions:

1. The activities permitted in Modification 1 of permit 1094 issued on November 5, 2001, as a one year modification, may be carried out in a similar manner throughout the duration of this permit (1094), which expires on May 31, 2003, thereby extending the modification by one year. These activities include a harvest of marked hatchery-origin steelhead between October 10, 2002, and March 31, 2003, in the vicinity of Ringold Springs Rearing Facility (RSRF), and in the Okanogan and Similkameen rivers. The harvest shall be regulated to allow only adipose fin-clipped, artificially-propagated steelhead to be retained. Regulations shall include night closures for all areas other that in the vicinity of RSRF and selective gear regulations in tributaries. All steelhead not externally marked must be released back to the wild unharmed. The capture and relocation of up to 648 adult steelhead at RSRF to landlocked lakes for recreational fishing will be permitted in Modification 1 and will be extended through the duration of permit 1094.

2. The WDFW may implement a recreational fishery in the mainstem Columbia River above Rocky Reach Dam upstream to Chief Joseph Dam utilizing statewide recreational fishing rules and restrictions with a daily harvest limit of two adipose fin-clipped steelhead adults.

3. The WDFW may implement a recreational fishery in the Methow River from the mouth upstream to the confluence with the Chewuch River near the town of Winthrop, Washington. Selective gear rules which include the use of only unscented artificial flies or lures with one single barbless hook only, and bait is prohibited, with a daily harvest limit of two adipose fin-clipped steelhead adults. Night closure would be in effect.

4. Creel survey interviews will be conducted by eight technicians, with two technicians assigned to each of the areas proposed for fisheries. These surveys will be scheduled using a stratified random sampling of weekdays and weekend days, morning and evening time periods, and adjusted to sample the time of year and areas that most angling effort occurs. The WDFW and NOAA Fisheries shall review potential impacts from the harvest and ensure the objectives of the hatchery supplementation program are being accomplished. The WDFW will include the estimated catch of hatchery and wild steelhead in the harvest and the estimated harvest impact to wild fish in the ESU for the 2002-2003 season in the annual report due August 1, 2003.

Permit 1094 covers the first stage of experimental hatchery operations involving the collection of broodstock and rearing and release of juveniles – this amendment addresses the following stage involving management of the adult fish when they return. The conditions proposed to be added to permit 1094 represent a relatively small component in the overall activities described in the original enhancement permit. The artificial propagation activities described in the original permit application, permit, and biological opinion all remain valid, and are not described again here. Detailed description of these activities and their effects on ESA-listed steelhead can be found in NMFS (1998a).

### 2.2 Action Area

The action area considered in this Biological Opinion includes all areas affected directly or indirectly by the proposed actions, not merely the immediate area involved in the action (50 CFR 402.02). Therefore, the action area for this consultation includes the specific areas where the proposed actions may take place and the potential areas where indirect effects may occur. The action area for the full suite of artificial propagation actions described in the original permit affected a large geographic area, including the Upper Columbia River basin and the mainstem Columbia River in Oregon and Washington – this action area is fully described in NMFS (1998a). Activities associated with the proposed amendment have a more limited scope. The action area would encompass the mainstem Columbia River below Priest Rapids Dam from the Old Hanford townsite powerline towers downstream to the Highway 395 bridge, the mainstem

Columbia River from Rocky Reach Dam upstream to Chief Joseph Dam, the Okanogan River (including the Similkameen River), the Methow River, and the adult trapping facilities at RSRF in the State of Washington (Figure 1).

# 3.0 Status of the Species and Critical Habitat

The UCR steelhead ESU is likely to be affected by the proposed action. Status of this species was fully described in the original opinion (NMFS 1998a) and in the more recent biological opinion on operation of the Federal Columbia River Power System (NMFS 2000; see especially Appendix A). Below is a summary of that information, and includes updates on adult return numbers and return composition.

UCR spring-run chinook, listed as endangered (March 24, 1999; 64 FR 14308) may also occur in the action area. However, due to run timing and timing of the proposed action considered here, they will not be affected by the proposed activities. Listed spring chinook in the UCR would not be affected by the harvest or trapping operations at RSRF because they are not present when the action would occur. The harvest and trapping activities would both take place starting in October and ending on or before March 31, 2003. Spring chinook do not spawn in the area of RSRF, and have completed their passage through this area of the mainstem by the middle of June. Listed spring chinook salmon do not occur in the Okanogan River subbasin. Therefore no adult spring chinook salmon will be affected by the proposed activities. In the Methow River very few spring chinook spawn below the confluence with the Chewuch River (<5% of total spawners in 2001, Heather Bartlett, WDFW personal communication). Spring chinook salmon adults spawn in August and September. The primary spring chinook spawning and rearing habitat is upstream of all proposed activities. Juvenile spring chinook that may be rearing in areas of the Methow River during the proposed activities will not be affected by the proposed actions because they are not susceptible to the gear employed.

## 3.1 Status of the Upper Columbia River Steelhead ESU

The UCR steelhead ESU (Figure 1) was listed as endangered on August 18, 1997 (62 FR 43937), and includes all natural-origin populations of steelhead in the Columbia River Basin upstream from the Yakima River, Washington, to the U.S./Canada Border. The status of these fish was considered so critical that steelhead in Wells Hatchery were also listed because they would be needed as a resource to determine whether hatcheries can be used to boost steelhead production in Upper Columbia River streams.

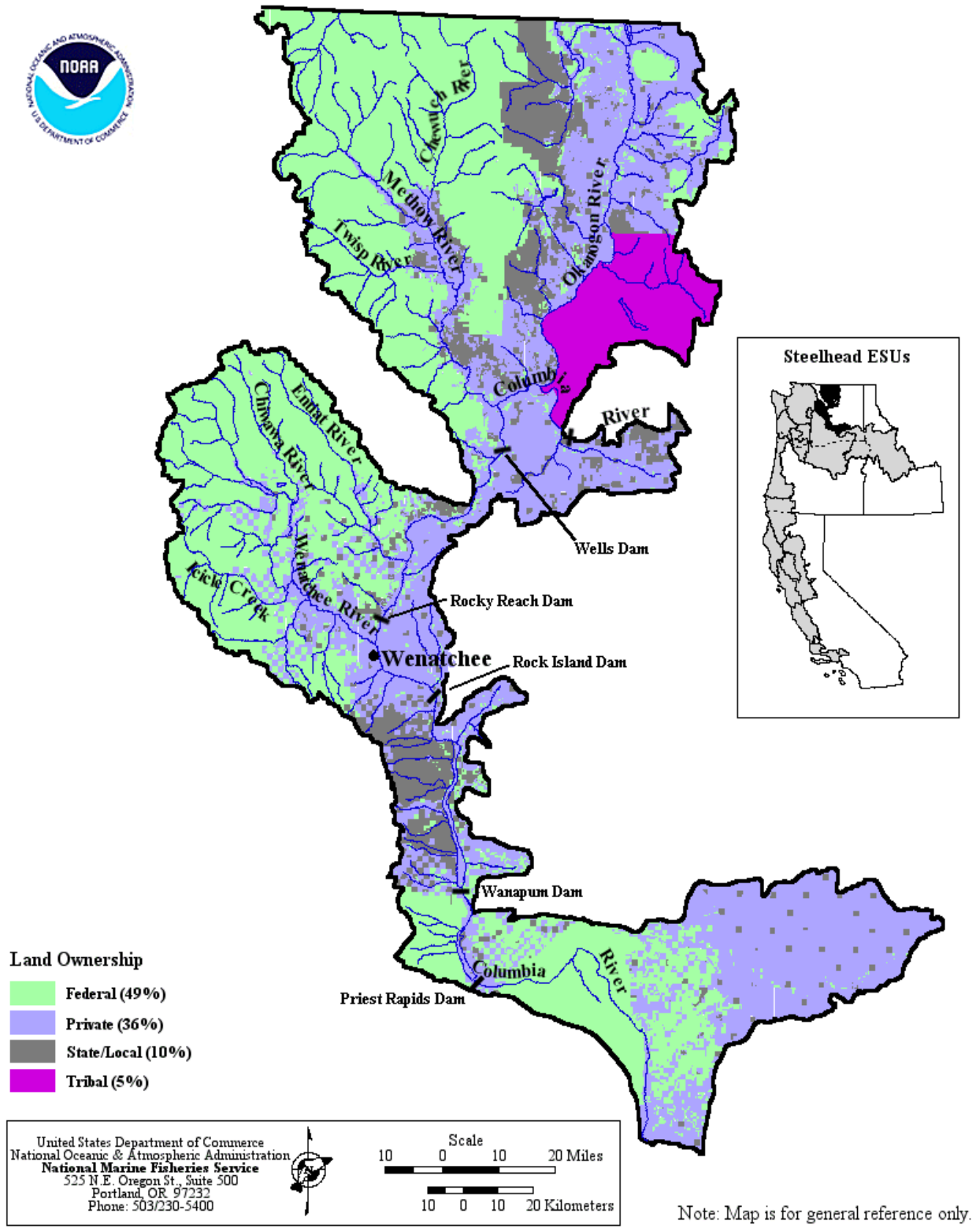


Figure 2. Upper Columbia River steelhead Evolutionarily Significant Unit.

Upper Columbia River steelhead inhabit the Columbia River reach and its tributaries upstream of the Yakima River. This region includes several rivers that drain the east slopes of the Cascades Mountains and several that originate in Canada (only U.S. populations are included in the ESU). Dry habitat conditions in this area are less conducive to steelhead survival than in many other parts of the Columbia basin (Mullan *et al.* 1992a). Although the life history of this ESU is similar to that of other inland steelhead, smolt ages are some of the oldest on the west coast (up to 7 years old), probably due to the ubiquitous cold water temperatures (Mullan *et al.* 1992b). Adults spawn later than in most downstream populations, remaining in freshwater up to a year before spawning.

Although runs during the period 1933 through 1959 may have already been affected by fisheries in the lower river, dam counts suggest a pre-fishery run size of more than 5,000 adults above Rock Island Dam. The steelhead spawning ground escapement objective established by WDFW for this area, including the Wenatchee, Entiat, and Methow subbasins, is 6,000 fish. The return of UCR natural-origin steelhead to Priest Rapids Dam declined from a 5-year average of 2,700 beginning in 1986 to a 5-year average of 900 beginning in 1994 (FPC 2002; Table 1). Most current natural production occurs in the Wenatchee and Methow River system, with a smaller run returning to the Entiat River. Current habitat conditions are not conducive to steelhead in the Okanogan River subbasin. A majority of the fish spawning in natural production areas are of hatchery origin. Indications are that populations in the Wenatchee, Methow, and Entiat rivers have not been self-sustaining. A replacement rate of greater than one generally indicated that a population is increasing in abundance from generation to generation; a replacement rate less than one indicates that a population is decreasing and , if maintained over a sufficiently long time the population will be extirpated. Natural cohort replacement rates prior to 1995 were 0.3 for populations in the Wenatchee River and no greater than 0.25 for populations in the Entiat River (Bugert 1997).

Several extinction analyses have been developed to attempt to determine the likelihood of persistence of various ESUs in the Columbia River basin. Analyses in the Cumulative Risk Initiative and Quantitative Analytical Review are described in NMFS (1998a) and extensively in the opinion on the Federal Columbia River Power System (FCRPS; NMFS 2000). Generally, population level data were not adequate for assessing average population growth rates or the risk of extinction for each of the three spawning populations. The CRI estimated an average growth rate (lambda) for the ESU as a whole of 0.860 (McClure *et al.* 2000). The estimated risk of absolute extinction within 100 years for the ESU as a whole was 84%.

Table 1. Adult summer steelhead counts at Priest Rapids, Rock Island, Rocky Reach, and Wells dams (FPC 2002).

| | Priest Rapids | | Rock Island | Rocky Reach | Wells |
|---|---|---|---|---|---|
| Year | Count | Wild Origin | Count | Count | Count |
| 1977 | 9,812 | | 9,925 | 7,416 | 5,382 |
| 1978 | 4,545 | | 3,352 | 2,453 | 1,621 |
| 1979 | 8,409 | | 7,420 | 4,896 | 3,695 |
| 1980 | 8,524 | | 7,016 | 4,295 | 3,443 |
| 1981 | 9,004 | | 7,565 | 5,524 | 4,096 |
| 1982 | 11,159 | | 10,150 | 6,241 | 8,418 |
| 1983 | 31,809 | | 29,666 | 19,698 | 19,525 |
| 1984 | 26,076 | | 24,803 | 17,228 | 16,627 |
| 1985 | 34,701 | | 31,995 | 22,690 | 19,757 |
| 1986 | 22,382 | 2,342 | 22,867 | 15,193 | 13,234 |
| 1987 | 14,265 | 4,058 | 12,706 | 7,172 | 5,195 |
| 1988 | 10,208 | 2,670 | 9,358 | 5,678 | 4,415 |
| 1989 | 10,667 | 2,685 | 9,351 | 6,119 | 4,608 |
| 1990 | 7,830 | 1,585 | 6,936 | 5,014 | 3,819 |
| 1991 | 14,027 | 2,799 | 11,018 | 7,741 | 7,715 |
| 1992 | 14,208 | 1,618 | 12,398 | 7,457 | 7,120 |
| 1993 | 5,455 | 890 | 4,591 | 2,815 | 2,400 |
| 1994 | 6,707 | 855 | 5,618 | 2,823 | 2,138 |
| 1995 | 4,373 | 993 | 4,070 | 1,719 | 946 |
| 1996 | 8,376 | 843 | 7,305 | 5,774 | 4,127 |
| 1997 | 8,948 | 785 | 7,726 | 7,726 | 4,107 |
| 1998 | 5,837 | 919 | 4,810 | 4,265 | 2,482 |
| 1999 | 8,456 | 1,428 | 6,361 | 4,815 | 3,557 |
| 2000 | 11,331 | na | 10,510 | 8,266 | 6,251 |
| 2001 | 23,549 | 4,803 | 20,071 | 14,721 | 11,254 |
| 2002[1] | 15,603 | 3,121 | 13,788 | 10,476 | 7,930 |
| 2002 total run[1] | 19,238 | 3,848 | na | na | na |
| 1995-1999 average | 7,198 | 994 | 6,054 | 4,860 | 3,044 |

[1] 2002 dam counts are preliminary as of October 7, 2002; total return forecast is based on sampling at Priest Rapids dam through September 19, 2002.

Hatchery practices (broodstock protocols and rearing and release strategies) leading to the outplanting of juvenile fish have changed in recent years, and these changes are reflected in the existing permit. The program emphasizes the contribution of natural origin steelhead to the artificially propagated population. All steelhead now released into the upper Columbia River above Wells Dam are progeny of natural and hatchery origin steelhead returning to Wells Dam.

Steelhead releases into the Wenatchee River basin are progeny of adults collected from the Wenatchee River. The purpose of these programs is to determine whether they can help boost steelhead production in UCR streams. Steelhead planted into the Okanogan subbasin have Wells Hatchery parents, and these fish serve as a back-up broodstock source in case there are insufficient returns in any given year. Okanogan releases are otherwise conducted to create a consistent recreational fishery opportunity in the UCR basin.

The steelhead smolts transferred to RSRF are from the earliest spawned steelhead at Wells Hatchery. This group of fish matures and spawns earlier than the wild, naturally-spawning steelhead in the ESU. Thus, the group of fish transferred to RSRF is intended to be a "reserve" population used only if returns to Wells Hatchery are extremely low. Since these fish are released at RSRF, they tend to home back to the facility and mill around in the mainstem Columbia River in the vicinity of RSRF from the time they return (August through October) until the time they begin to spawn in January and February. Little if any steelhead spawning occurs in the vicinity of RSRF or the nearby mainstem. Steelhead returning to the area of RSRF either do not contribute to spawning, or may eventually move out of the area into spawning areas for other ESUs (e.g., the Yakima, Walla Walla, or Tucannon Rivers).

Returns of hatchery steelhead to the Upper Columbia River can fluctuate dramatically from year to year (Table 1; Figure 2). Depending on the overall survival rates, in some years the total return may not be sufficient to fully seed the available habitat in the ESU. In other years (like in 2001 and 2002), steelhead returns are much greater than full seeding escapement levels. At the time of ESA listing, it was determined that in some years hatchery returns might

> "...exceed the number of returns necessary to produce the number of offspring NMFS considers advisable for release into this ESU. This surplus may therefore be, by definition, not essential for recovery efforts. In that case, hatchery operators may be faced with a choice between destroying the excess returns or using them for some other purpose. In making its decision today to include the Wells Hatchery stock as part of the listed population, NMFS does not intend to foreclose the possibility of using such excess returns to provide limited harvest opportunities consistent with the conservation of this ESU." (August 18, 1997; 62 FR 43937 at 43951)

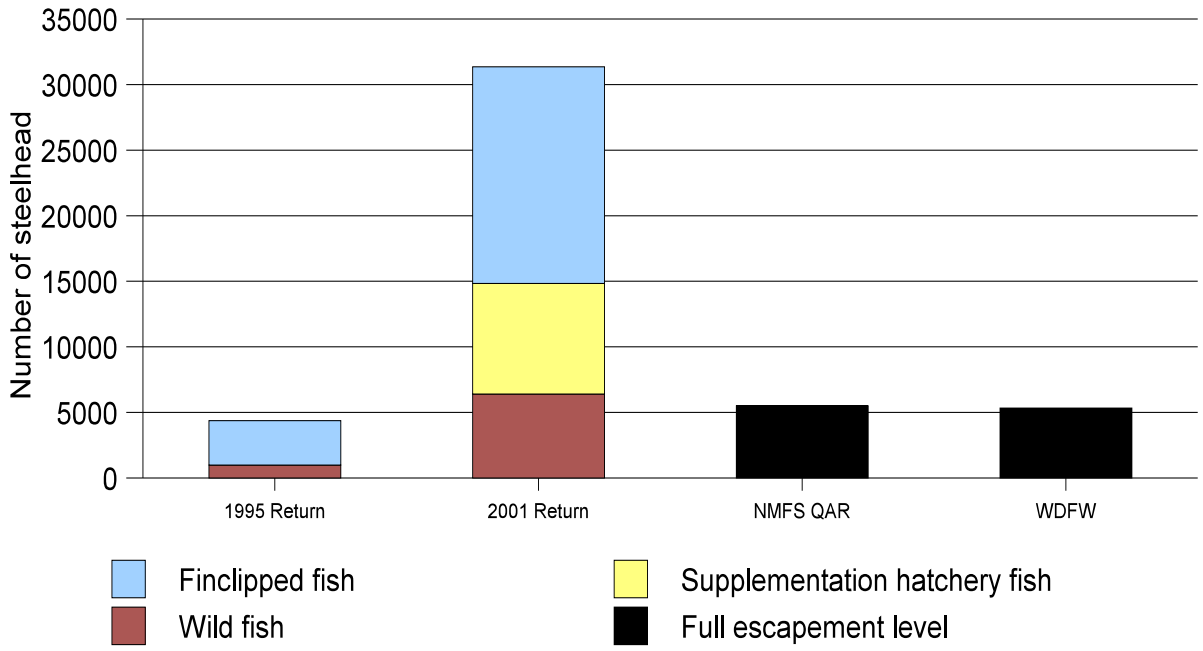


Figure 3. Example of the substantial changes in hatchery fish returns over a short period of time. The number of hatchery fish released to produce the 1995 and 2001 hatchery fish returns were the same. NMFS' QAR report (Cooney 2000) and WDFW (2001) full seeding escapement levels for the ESU are also shown. Counts are from Priest Rapids Dam (lowermost dam in the ESU).

Because of the potential for large changes in fish abundance over a short time period and because returns may be far greater than what is needed for enhancement and broodstock needs in the ESU (see Figure 2), WDFW requests additional measures be included in the existing permit to further manage surplus returns to RSRF if warranted in 2002. As stated above, the potential to collect large numbers of steelhead at the RSRF is limited because of the limited water attractant from the hatchery outflow.

### 3.2 Critical Habitat

Critical habitat was designated for the Upper Columbia River steelhead ESU on February 16, 2000 (65 FR 7764). However, on April 30, 2002, the U.S. District Court for the District of Columbia approved a consent decree vacating the February 2000 critical habitat designation for this and 18 other ESUs pending new rule making. Therefore the habitat analysis for UCR steelhead in this consultation will include consideration of the proposed action s effects on the species habitat to determine whether those actions are likely to jeopardize the continued existence of the species.

# 4.0 Environmental Baseline

Environmental baselines for biological opinions include the past and present impacts of all state, Federal or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process (50 CFR 402.02). The environmental baseline for this opinion is generally included in the extensive discussion of environmental baseline in the FCRPS biological opinion (NMFS 2000). What follows below is a summary of that discussion. Generally the activities having the greatest impact on the environmental baseline of the UCR steelhead ESU fall into four categories: hydropower system impacts on juvenile outmigration and adult return migration; habitat degradation effects on water quality and availability of adequate incubation and rearing locations; harvest impacts on adults; and artificial propagation impacts. Fish are also affected by fluctuations in natural conditions.

## 4.1 The Hydropower System

Hydropower development in the Columbia basin has dramatically affected anadromous salmonids in the basin. Storage dams have eliminated spawning and rearing habitat and altered the natural hydrograph of the Snake and Columbia Rivers – decreasing spring and summer flows and increasing fall and winter flows. Power operations cause flow levels and river elevations to fluctuate – slowing fish movement through reservoirs, altering riparian ecology, and stranding fish in shallow areas. The dams in the Columbia River migration corridors kill smolts and adults and alter their migrations. The dams have also converted the once-swift river into a series of slow-moving reservoirs – slowing the smolts' journey to the ocean and creating habitat for predators. Because the UCR steelhead must navigate four to nine major hydroelectric projects during their up- and downstream migrations (and experience the effects of other dam operations occurring upstream from their ESU boundary), they feel the influence of all the impacts listed above.

However, ongoing consultations between NOAA Fisheries and the Bonneville Power Administration (BPA), the U.S. Army Corps of Engineers (Corps), the USFWS, and the Bureau of Reclamation (BOR) have brought about beneficial changes in the operation and configuration of the Columbia River hydropower system. For example, increased spill at the dams allows smolts to avoid both turbine intakes and bypass systems; increased flow in the mainstem Snake and Columbia Rivers provides better inriver conditions for smolts; and better smolt transportation (through the addition of new barges and by modifying existing barges) helps the young salmonids make their way down to the ocean. However, even though there have been a number of improvements, more are needed because the Federal hydropower system continues to kill a significant number of fish from some ESUs.

Several non-Federal projects licensed by the Federal Energy Regulating Commission (FERC) also affect UCR steelhead. Operations of the Wells, Rocky Reach, Rock Island, Wanapum, and

Priest Rapids Dams are currently governed by existing FERC license requirements and settlement agreements. Each of these license requirements and settlement agreements specify actions intended to reduce the effects of project operations on anadromous salmonids. For example, a spring flow objective of 135 thousand cubic fee per second at Priest Rapids Dam was established for the mid-Columbia River in the 1998 FCRPS Supplemental Biological Opinion (NMFS 1998a). It is hoped that this and other actions will improve salmon survival, but much remains to be done to offset the effects of hydropower development, and for now the net impact of the hydropower system on UCR steelhead survival is still unequivocally negative.

### 4.2 Human-Induced Habitat Degradation

The quality and quantity of freshwater habitat in much of the Columbia River Basin have declined dramatically in the last 150 years. Forestry, farming, grazing, road construction, hydrosystem development, mining, and development have radically changed the historical habitat conditions of the basin. Water quality in streams throughout the Columbia River Basin has been degraded by human activities such as dams and diversion structures, water withdrawals, farming and animal grazing, road construction, timber harvest activities, mining activities, and development. Over 2,500 streams, river segments, and lakes in the Northwest do not meet Federally-approved, state and Tribal water quality standards and are now listed as water-quality-limited under Section 303(d) of the Clean Water Act. Tributary water quality problems contribute to poor water quality when sediment and contaminants from the tributaries settle in mainstem reaches and the estuary.

Most of the water bodies in Oregon, Washington, and Idaho on the 303(d) list do not meet water quality standards for temperature. High water temperatures adversely affect salmonid metabolism, growth rate, and disease resistance, as well as the timing of adult migrations, fry emergence, and smoltification. Many factors can cause high stream temperatures, but they are primarily related to land-use practices rather than point-source discharges. Some common actions that cause high stream temperatures are the removal of trees or shrubs that directly shade streams, water withdrawals for irrigation or other purposes, and warm irrigation return flows. Loss of wetlands and increases in groundwater withdrawals contribute to lower base-stream flows which, in turn, contribute to temperature increases. Activities that create shallower streams (e.g., channel widening) also cause temperature increases.

Pollutants also degrade water quality. Salmon require clean gravel for successful spawning, egg incubation, and the emergence of fry. Fine sediments clog the spaces between gravel and restrict the flow of oxygen-rich water to the incubating eggs. Excess nutrients, low levels of dissolved oxygen, heavy metals, and changes in pH also directly affect the water quality for salmon and steelhead.

Water quantity problems are also a significant cause of habitat degradation and reduced fish production. Millions of acres of land in the basin are irrigated. Although some of the water withdrawn from streams eventually returns as agricultural runoff or groundwater recharge, crops

consume a large proportion of it. Withdrawals affect seasonal flow patterns by removing water from streams in the summer (mostly May through September) and restoring it to surface streams and groundwater in ways that are difficult to measure. Withdrawing water for irrigation, urban consumption, and other uses increases temperatures, smolt travel time, and sedimentation. Return water from irrigated fields can introduce nutrients and pesticides into streams and rivers. Water withdrawals (primarily for irrigation) have lowered summer flows in nearly every stream in the basin and thereby profoundly decreased the amount and quality of rearing habitat.

Blockages that stop downstream and upstream fish movement exist at many dams and barriers, whether they are for agricultural, hydropower, municipal/industrial, or flood control purposes. Culverts that are not designed for fish passage also block upstream migration. Migrating fish are sometimes killed by being diverted into unscreened or inadequately screened water conveyances or turbines. While many fish-passage improvements have been made in recent years, manmade structures continue to block migrations or kill fish throughout the basin.

On the landscape scale, human activities have affected the timing and amount of peak water runoff from rain and snowmelt. Forest and range management practices have changed vegetation types and density which, in turn, affect runoff timing and duration. Many riparian areas, flood plains, and wetlands that once stored water during periods of high runoff have been destroyed by development that paves over or compacts soil – thus increasing runoff and altering its natural pattern.

Land ownership has also played its part in the region's habitat and land-use changes. Federal lands, which compose 50 percent of the basin, are generally forested and influence upstream portions of the watersheds. While there is substantial habitat degradation across all ownerships, in general, habitat in many headwater stream sections is in better condition than in the largely non-Federal lower portions of tributaries (Doppelt *et al*. 1993, Frissell 1993, Henjum *et al*. 1994, Quigley and Arbelbide 1997). In the past, valley bottoms were among the most productive fish habitats in the basin (Stanford and Ward 1992, Spence *et al*. 1996, ISG 1996). Today, agricultural and urban land development and water withdrawals have significantly altered the habitat for fish and wildlife. Streams in these areas typically have high water temperatures, sedimentation problems, low flows, simplified stream channels, and reduced riparian vegetation.

At the same time some UCR steelhead habitat was being destroyed by water withdrawals in the Columbia basin, water impoundments in other areas dramatically reduced UCR steelhead habitat by inundating large amounts of spawning and rearing habitat and reducing migration corridors, for the most part, to a single channel. Floodplains have been reduced in size, off-channel habitat features have been lost or disconnected from the main channel, and the amount of large woody debris (large snags/log structures) in rivers has been reduced. Most of the remaining habitats are affected by flow fluctuations associated with reservoir management.

The Columbia River estuary (through which all the basin's species – including UCR steelhead – must pass) has also been changed by human activities. Historically, the downstream half of the

estuary was a dynamic environment with multiple channels, extensive wetlands, sandbars, and shallow areas. The mouth of the Columbia River was about four miles wide. Winter and spring floods, low flows in late summer, large woody debris floating downstream, and a shallow bar at the mouth of the Columbia River kept the environment dynamic. Today, navigation channels have been dredged, deepened, and maintained; jetties and pile-dike fields have been constructed to stabilize and concentrate flow in navigation channels; marsh and riparian habitats have been filled and diked; and causeways have been constructed across waterways. These actions have decreased the width of the mouth of the Columbia River to two miles and increased the depth of the Columbia River channel at the bar from less than 20 to more than 55 feet. Sand deposition at river mouths has extended the Oregon coastline approximately four miles seaward and the Washington coastline approximately two miles seaward (Thomas 1981).

More than 50 percent of the original marshes and spruce swamps in the estuary have been converted to industrial, transportation, recreational, agricultural, or urban uses. More than 3,000 acres of intertidal marsh and spruce swamps have been converted to other uses since 1948 (Lower Columbia River Estuary Program [LCREP] 1999). Many wetlands along the shore in the upper reaches of the estuary have been converted to industrial and agricultural lands after levees and dikes were constructed. Furthermore, water storage and release patterns from reservoirs upstream of the estuary have changed the seasonal pattern and volume of discharge. The peaks of spring/summer floods have been reduced, and the amount of water discharged during winter has increased.

Human-cause habitat alterations have also increased the number of predators feeding on UCR steelhead. For example, researchers estimated that a population of terns on Rice Island (16,000 birds in 1997) consumed six to 25 million outmigrating salmonid smolts during 1997 (Roby *et al.*1998) and seven to 15 million outmigrating smolts during 1998 (Collis *et al*. 1999). Rice Island is a dredged material disposal site in the Columbia River estuary; it was created by the Corps under its Columbia River Channel Operation and Maintenance Program. As another example, populations of Northern pikeminnow (a voracious salmonid predator) in the Columbia River has skyrocketed since the advent of the mainstem dams and their warm, slow-moving reservoirs.

To counteract all the ill effects listed in this section, Federal, state, tribal, and private entities have – singly and in partnership – begun recovery efforts to help slow and, eventually, reverse the decline of salmon and steelhead populations. Nevertheless, while these efforts represent a number of good beginnings, it must be stated that much remains to be done to recover UCR steelhead and other salmonids in the Columbia basin. Full discussions of these efforts can be found in the FCRPS biological opinion.

### 4.3 Artificial Propagation

For more than 100 years, hatcheries in the Pacific Northwest have been used to (a) produce fish for harvest and (b) replace natural production lost to dam construction and other development –

not to protect and rebuild naturally-produced salmonid populations. As a result, most salmonid populations in the region are primarily derived from hatchery fish. In 1987, for example, 95 percent of the coho salmon, 70 percent of the spring chinook salmon, 80 percent of the summer chinook salmon, 50 percent of the fall chinook salmon, and 70 percent of the steelhead returning to the Columbia River Basin originated in hatcheries (CBFWA 1990). Because hatcheries have traditionally focused on providing fish for harvest and replacing declines in native runs (and generally not carefully examined their own effects on local populations), it is only recently that the substantial effects of hatcheries on native wild populations been demonstrated. For example, the production of hatchery fish, among other factors, has contributed to the 90 percent reduction in wild coho salmon runs in the lower Columbia River over the past 30 years (Flagg et al. 1995).

NOAA Fisheries has identified four primary ways hatcheries harm wild-run salmon and steelhead: (1) ecological effects, (2) genetic effects, (3) overharvest effects, and (4) masking effects. Ecologically, hatchery fish can predate on, displace, and compete with wild fish. These effects are most likely to occur when fish are released in poor condition and do not migrate to marine waters, but rather remain in the streams for extended rearing periods. Hatchery fish also may transmit hatchery-borne diseases, and hatcheries themselves may release disease-carrying effluent into streams. Hatchery fish can affect the genetic variability of native fish by interbreeding with them. Interbreeding can also result from the introduction of native stocks from other areas. Interbred fish are less adapted to the local habitats where the original native stock evolved and may therefore be less productive there.

In many areas, hatchery fish provide increased fishing opportunities. However, when wild fish mix with hatchery stock in these areas, smaller or weaker wild stocks can be overharvested. Moreover, when migrating adult hatchery and wild fish mix on the spawning grounds, the health of the wild runs and the habitat's ability to support them can be overestimated because the hatchery fish mask the surveyors' ability to discern actual wild run conditions.

Currently, the role hatcheries are to play in the Columbia Basin is being redefined under the Basinwide Salmon Recovery Strategy (Federal Caucus 2000) from simple production to supporting species recovery. The efforts will focus on maintaining species diversity and supporting weak stocks. The program will also have an associated research element designed to clarify interactions between natural and hatchery fish and quantify the effects supplementation has on natural fish. The final facet of the strategy is to use hatcheries to create fishing opportunities that are benign to listed populations (e.g., terminal area fisheries). For more detail on the use of hatcheries in recovery strategies, please see the Basinwide Salmon Recovery Strategy.

### 4.4 Harvest

Salmon and steelhead have been harvested in the Columbia basin as long as there have been people there. Commercial fishing developed rapidly with the arrival of European settlers and the advent of canning technologies in the late 1800s. The development of non-Indian fisheries began

in about 1830; by 1861, commercial fishing was an important economic activity. The early commercial fisheries used gill nets, seines hauled from shore, traps, and fish wheels. Later, purse seines and trolling (using hook and line) fisheries developed. Recreational fishing began in the late 1800s, occurring primarily in tributary locations (ODFW and WDFW 1998). Steelhead have formed a major component of these fisheries for decades.

Initially, the non-Indian fisheries targeted spring and summer chinook salmon, and these runs dominated the commercial harvest during the 1800s. Eventually the combined ocean and freshwater harvest rates for Columbia River spring and summer chinook salmon exceeded 80 percent and sometimes 90 percent of the run – accelerating the species' decline (Ricker 1959). From 1938 to 1955, the average harvest rate dropped to about 60 percent of the total spring chinook salmon run and appeared to have a minimal effect on subsequent returns (NMFS 1991). Until the spring of 2000 – when a relatively large run of hatchery spring chinook salmon returned and provided a small commercial Tribal fishery – no commercial season for spring chinook salmon had taken place since 1977. Present Columbia River harvest rates are very low compared with those from the late 1930s through the 1960s (NMFS 1991). Though steelhead – UCR steelhead included – were never as important a component of the Columbia basin's fisheries as chinook, net-based fisheries generally do not discriminate among species, so it can fairly be said that harvest has also contributed to the UCR steelhead declines.

Salmonids' capacity to produce more adults than are needed for spawning offers the potential for sustainable harvest of naturally-produced (versus hatchery-produced) fish. This potential can be realized only if two basic management requirements are met: (1) enough adults return to spawn and perpetuate the run, and (2) the productive capacity of the habitat is maintained. Catches may fluctuate in response to such variables as ocean productivity cycles, periods of drought, and natural disturbance events, but as long as the two management requirements are met, fishing can be sustained indefinitely. Unfortunately, both prerequisites for sustainable harvest have been violated routinely in the past. The lack of coordinated management across jurisdictions, combined with competitive economic pressures to increase catches or to sustain them in periods of lower production, resulted in harvests that were too high and escapements that were too low. At the same time, habitat has been increasingly degraded, reducing the capacity of the salmon stocks to produce numbers in excess of their spawning escapement requirements.

Fish harvest in the Columbia River basin affects the listed species by incidentally taking them in fisheries that target non-listed species. UCR steelhead are not harvested in ocean fisheries. The largest potential impacts on UCR steelhead come from treaty Indian and non-tribal fisheries in the Columbia River mainstem. Most take is in the form of catch and retention, mortalities resulting from hooking and release, and mortalities resulting from encounters with fishing gear as a consequence of fishery activities. Two recent opinions describe harvest rate impacts from mainstem Columbia River fisheries accruing to listed UCR salmonids returning in 2001. Both opinions conclude that, due to the constraints set on harvest levels as described in the opinions, the activities associated with the treaty Indian and non-tribal fisheries during the winter/spring/summer and fall seasons were not likely to jeopardize the continued existence of

any of the listed species (NMFS 2001a; NMFS 2001b). The development of fishery regimes for the Columbia River mainstem includes evaluation of escapement needs and impacts to Upper Columbia River spring chinook and steelhead.

In the mainstem winter/spring/summer seasons, UCR spring chinook and SR spring/summer chinook are expected to be the primary management constraints, in most years, for the mainstem fisheries in that they will define the upper limit of allowable harvest. Harvest rate limits are described as percentages of the adult return to Bonneville Dam. For 2002, based on preseason run size information, the applicable harvest rate limits for UCR hatchery and natural-origin steelhead in treaty Indian fisheries were 2.7% and 3.8%, respectively. In non-tribal mainstem fisheries, harvest rates for UCR natural-origin steelhead did not exceed 2%; the harvest rate limit for UCR hatchery-origin steelhead was 6%. These harvest rate limits will apply in the early part of 2003.

In the mainstem Columbia River fall season treaty Indian fisheries for 2002, the expected harvest rates on UCR natural and hatchery-origin steelhead were 5.0% and 6.7%, respectively. In non-tribal fisheries, harvest rates for UCR natural and hatchery-origin steelhead did not exceed 2% and 15%, respectively.

For years, the response to declining catches was hatchery construction to produce more fish. Because hatcheries require fewer adults to sustain their production, harvest rates in the fisheries were allowed to remain high, or even increase, further exacerbating the effects of overfishing on the naturally-produced (non-hatchery) runs mixed in the same fisheries. More recently, harvest managers have instituted reforms including weak stock, abundance-based, harvest rate, and escapement-goal management. As with improvements being made in other phases of the UCR steelhead's life history, it will take some time for these (and future) measures to contribute greatly to the species recovery, but the effort has begun.

### 4.5 Natural Conditions

Changes in the freshwater and marine environments cause changes in salmonid abundance. Recent evidence suggests that marine survival among salmonids fluctuates in response to 20- to 30-year cycles of climatic conditions and ocean productivity (Cramer *et al*. 1999). This phenomenon has been referred to as the Pacific Decadal Oscillation. In addition, large-scale climatic regime shifts, such as El Niño, appear to change ocean productivity. During the first part of the 1990s, much of the Pacific Coast was subject to a series of very dry years. More recently, severe flooding has adversely affected some stocks (e.g., the low returns of Lewis River bright fall chinook salmon in 1999).

A key factor affecting many West Coast stocks – including UCR steelhead – has been a general 30-year decline in ocean productivity. The mechanism whereby stocks are affected is not well understood, partially because the pattern of response to these changing ocean conditions has differed among stocks, presumably due to differences in their ocean timing and distribution. It is

presumed that survival is driven largely by events occurring between ocean entry and recruitment to a subadult life stage.

Salmon and steelhead are exposed to high rates of natural predation, particularly during freshwater rearing and migration stages. Ocean predation may also contribute to significant natural mortality, although it is not know to what degree. In general, salmonids are prey for pelagic fishes, birds, and marine mammals, including harbor seals, sea lions, and killer whales. There have been recent concerns that the rebound of seal and sea lion populations – following their protection under the Marine Mammal Protection Act of 1972 – has caused a substantial number of salmonid deaths. In recent years, for example, sea lions have learned to target upper Willamette River spring chinook salmon in the fish ladder at Willamette Falls.

# 5.0 Effects of The Action

Below is an analysis of the effects on listed UCR steelhead anticipated from the proposed amendment proposed for section 10 permit #1094. A complete analysis of effects of the permit can be found in NMFS (1998a), so the following analysis addresses the actual amendment provisions.

## 5.1 Extension of Modification 1 Provisions for Duration of Permit 1094 to May 2003

The effects of the proposed amendment of permit 1094 to extend actions permitted in modification 1 through May 31, 2003 are analogous to the effects analyzed in the Biological Opinion on modification 1 and are summarized below.

The WDFW proposes to allow a harvest in the vicinity of RSRF beginning in October 2002 and the capture and transport of up to 648 adipose fin-clipped steelhead. An estimated 6,200 hatchery steelhead and 192 natural origin steelhead will be available for harvest in the vicinity of RSRF (Bob Leland, WDFW, personal communication). Both natural and hatchery-origin listed steelhead may be taken during the proposed action. The potential impacts on listed natural-origin steelhead from harvest in the vicinity of RSRF is from capture and release and the mortality associated with capture and released, and total 58 fish and 3 fish, respectively. This estimate is based upon the following analysis.

By October 10, 2002, most of the steelhead run returning to the Upper Columbia River ESU this year are expected to be upstream of RSRF. Priest Rapids Dam is the next dam located above RSRF. Based on passage monitoring at Priest Rapids Dam since 1986, more than 95% of the steelhead will have passed above this dam by October 15$^{th}$. The number of natural-origin steelhead passing Priest Rapids Dam this year is expected to be about 3,848 fish (Art Viola, WDFW, personal communication). If 5% of these natural-origin fish are still below Priest Rapids Dam, approximately 192 natural-origin steelhead may be in the vicinity of RSRF and

vulnerable to being caught if harvest were to occur. The WDFW estimates approximately 6,200 hatchery-origin steelhead are currently in the vicinity of RSRF (this equates to a ratio of 1 natural-origin steelhead to 32 hatchery-origin steelhead). A typical encounter rate for steelhead fisheries if the season occurred throughout the entire run would likely be in the range of 10 to 30% (ODFW 2001). The best available information shows approximately 5% of steelhead caught and released by recreational fishers die when angling in cool water temperatures (<10ºC; Hooton 1987; Technical Advisory Committee for Columbia River fisheries). If 30% of the natural-origin steelhead present in the RSRF area were caught by anglers, an estimated three fish would potentially die (i.e., 192 fish x 30% encounter rate x 5% hook-release mortality = 2.88 fish). If 10% of the steelhead present in the RSRF area were caught, approximately one natural-origin fish might potentially die as a result of catch and release (Leland 2002a).

The overall mortality rate to the natural-origin steelhead return this season if harvest at RSRF occurs would range from 0.03% to 0.08%, given the numbers above (i.e., 1 or 3 incidental mortalities out of a return of 3,848 fish) and based on previous analysis. The loss of one to three fish in an area where there is no spawning habitat would have no more than a small effect, if any, on the productivity and population dynamics of the ESU even when the other sources of adult mortality (i.e., dam passage mortality, overwinter mortality) are considered.

Implementing this harvest would also support the already permitted and analyzed broodstock management objectives (NMFS 1998b). The returns of natural-origin steelhead and hatchery steelhead intended to be used for enhancement purposes are sufficient to fully seed the existing habitat in the ESU. Steelhead released from the RSRF were not intended to be used for enhancement under conditions other than extremely low run years efforts because of their differences in spawn timing. If not harvested or transported, these fish would stray into the Yakima, Walla Walla, or Tucannon rivers, or head upstream to spawn in the Upper Columbia River, thereby increasing the overcrowding and increasing the already overlarge hatchery fish proportion of all steelhead that will spawn naturally. Harvest of these surplus fish will reduce their straying into areas used by natural-origin and hatchery supplementation fish, and thus benefit the listed species. The capture and transport of up to 648 adipose fin-clipped steelhead from RSRF to landlocked lakes for harvest is also consistent with management objectives for the same reasons.

Modification 1 of permit 1094 authorized WDFW to conduct a recreational harvest fishery on steelhead in 79 miles of the Okanogan River, from the mouth upstream. The area from Zosel Dam downstream to 1/4 mile below the railroad trestle was closed. The area of harvest includes the Similkameen River from the mouth upstream eight miles to Enloe Dam. Only artificial lures and flies were allowed with a night closure in effect. Any natural-origin steelhead inadvertently caught were released back to the wild unharmed. The fishery conducted in 2001 resulted in an estimated four mortalities.

The WDFW estimates that 4,700 hatchery steelhead and 192 natural origin steelhead are returning to the Okanogan River basin in 2002 (this equates to a ratio of 1 natural-origin

steelhead to 24 hatchery-origin steelhead). Sufficient numbers of steelhead to fill broodstock needs have been collected at other sites in the basin. The harvest will take place in areas where spawning habitat is estimated to be fully seeded with 600 spawners. The abundance of steelhead provides a recreational harvest opportunity on the excess hatchery steelhead. The requirement to release unmarked steelhead unharmed will minimize adverse impacts on the natural origin fish. Any mortalities of steelhead would result from hooking mortalities incidental to release. If it is assumed, for the purpose of this analysis, that all naturally produced steelhead adults in the Okanogan Rive encounter the fishery, then the estimated hooking mortality rate of 5% results in a calculated mortality of three natural origin steelhead (192 x 0.3 x 0.05=2.88). As described above, the intent for steelhead in the Okanogan River is to provide fisher opportunity unless needed to provide hatchery broodstock backfill for programs elsewhere in the basin- such backfill is not needed this year. The loss of three fish in an area where there is limited spawning habitat would have no more than a small effect, if any, on the productivity and population dynamics of the ESU even when the other sources of adult mortality (i.e., dam passage mortality, overwinter mortality) are considered.

Impacts on the habitat of the ESA-listed species are expected to be minor. Most activities would occur in existing recreational areas. Possible impacts to riparian vegetation and habitat would occur primarily through anglers walking and wading along the stream and the movement of boats and gear to the water.

### 5.2 Mainstem Columbia River

The proposed amendment would allow WDFW to implement a recreational harvest fishery in the mainstem Columbia River from above Rocky Reach Dam upstream to Chief Joseph Dam. Any natural-origin steelhead which may be inadvertently caught would be released back to the wild unharmed.

The mainstem Columbia River is a migration corridor for steelhead returning to tributaries to spawn. The abundance of hatchery steelhead can provide for a recreational harvest opportunity on these excess hatchery steelhead, because the harvest will focus on the abundant surplus hatchery fish returns, thereby decreasing the ratio of hatchery origin to natural origin steelhead on the spawning grounds. Additionally, the requirement to release unmarked steelhead unharmed minimizes adverse impacts on the natural origin component of the run. The estimated 5% hooking mortality rate indicates that approximately four natural origin steelhead may be killed during this fishery. This incidental mortality will not alter the average growth rate (lambda) for the ESU as a whole. However, an activity that increases the proportion of natural to hatchery origin spawners, while still exceeding the spawning habitat capacity of the basin is consistent with recovery goals. The impacts of this activity under the current conditions of an exceptionally high return of steelhead to the UCR basin, is not expected to have any negative effect on the status of the UCR steelhead ESU, and may ameliorate sone adverse effects.

Impacts on the habitat of the ESA-listed species are expected to be minor. Most activities would

occur in existing recreational areas. Possible impacts to riparian vegetation and habitat would occur primarily through anglers walking and wading along the stream and the movement of boats and gear to the water.

### 5.3 Methow River

The proposed amendment will allow WDFW to conduct a recreational fishery on steelhead in the Methow River from the mouth upstream to the confluence with the Chewuch River near Winthrop, Washington. Only artificial lures and flies, and single barbless hooks would be allowed and night closure would be in effect. Any natural-origin steelhead which may be inadvertently caught would be released back to the wild unharmed.

In 2002, an abundance of hatchery steelhead are returning to the Methow River. The presence of an adipose fin-clip to allow identification of some hatchery fish was applied as a tool to specifically manage those steelhead in the tributaries utilizing a recreational fishery in years of high returns.

The 2002 run estimate is 7,671 hatchery steelhead are returning to the Methow River. In addition, approximately 885 natural origin steelhead are returning to the Methow River (this equates to a ratio of 1 natural-origin steelhead to 9 hatchery-origin steelhead) (Leland 200a). The harvest is proposed in the lower Methow River as steelhead migrate to the upper Methow Basin to spawn. The harvest will target the abundant surplus hatchery fish returns, thereby decreasing the proportion of hatchery origin to natural origin steelhead on the spawning grounds. Based on an estimated 5% hooking mortality, 13 natural origin steelhead may be killed. This incidental mortality is not expected to have any negative effect on the status or recovery of the UCR steelhead ESU. This incidental mortality will not alter the average growth rate (lambda) for the ESU as a whole. The impact of this activity under the current conditions of an exceptionally high return of steelhead to the UCR basin is not expected to have any negative effect on the status of the UCR steelhead ESU and in addition will avoid exceeding spawning habitat capacity.

Impacts on the habitat of the ESA-listed species are expected to be minor. Most activities would occur in existing recreational areas. Possible impacts to riparian vegetation and habitat would occur primarily through anglers walking and wading along the stream and the movement of boats and gear to the water.

### 5.4 Fishery Monitoring

The proposed amendment will require WDFW to monitor the fishery activities utilizing intensive creel survey interviews. This will help WDFW and NOAA Fisheries to review the above analysis, educate the angling public of the ESU status in the basin and facilitate enforcement of the fishery regulations while demonstrating the agencies ability to effectively manage protected resources under unanticipated conditions such as the high return of UCR steelhead in 2001 and 2002.

## 6.0 Cumulative Effects

Cumulative effects include the effects of future state, tribal, local or private actions not involving Federal activities that are reasonably certain to occur within the action area of the Federal action subject to this consultation. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of the Act. The action area defined in this consultation is fully described in NMFS (1998a).

A full discussion of cumulative effects in this area can be found in the FCRPS opinion (NMFS 2000), many of which are relevant to this discussion. State, Tribal and local government actions will likely to be in the form of legislation, administrative rules or policy initiatives. Generally, a number of habitat improvements are being undertaken by the State of Washington and tribal governments. Because these are long-term projects, their effects are uncertain. Local governments are also involved in habitat improvement projects, but as with other habitat projects their impacts will be measured on a long-term basis. Government and private actions may encompass changes in land and water uses – including ownership and intensity – any of which could impact listed species or their habitat. Government actions are subject to political, legislative, and fiscal uncertainties. These realities, added to geographic scope of the action area which encompasses numerous government entities exercising various authorities and the many private landholdings, make any analysis of cumulative effects difficult and frankly speculative.

*Representative State Actions*

Each state in the Columbia River basin administers the allocation of water resources within its borders. Most streams in the basin are over-appropriated even though water resource development has slowed in recent years. Washington closed the mainstem Columbia River to new water withdrawals, and is funding a program to lease or buy water rights. It is hope that this will improve water quantity over the long term. The state governments are cooperating with each other and other governments to increase environmental protections, including better habitat restoration and hatchery and harvest reforms. NOAA Fisheries also cooperates with the state water resource management agencies in assessing water resource needs in the Columbia River basin and in developing flow requirements that will benefit listed fish. During low-water years, however, there may not be enough flow to meet the fishes' needs. These government efforts could be reduced or even discontinued, so their cumulative effects on listed fish is unpredictable.

If these programs are actually implemented, there may be some improvement may be seen in various habitat features considered important for the listed species. The Oregon Plan also identifies several private and public cooperative programs for improving the environment for listed species. The success of such programs will depend on continued interest and cooperation among the parties involved.

The state of Washington has various strategies and programs designed to improve the habitat for

listed species and assist in recovery planning. One such is the Salmon Recovery Planning Act – a framework for developing watershed restoration projects. The state is also developing a water quality improvement scheme through the development of TMDLs. As with the Oregon initiatives, these programs could benefit the listed species if implemented and sustained.

Economic diversification has contributed to population growth and movement in the states – a trend likely to continue for the next few decades. Such population trends will engender greater demands in the action area for electricity, water, and buildable land; they will affect water quality directly and indirectly; and they will increase the need for transportation, communication, and other infrastructure development. The impacts associated with economic and population demands will affect habitat features (such as water quality and quantity) that are important to the survival and recovery of the listed species. The overall effect is likely to be negative unless carefully planned for and mitigated.

Some of the state programs described above are designed to address these impacts. Oregon also has a statewide land use planning program with growth management and natural resource protection goals. Washington enacted a Growth Management Act to help communities plan for growth and address growth impacts on the natural environment. If the programs continue they may help lessen some of the potential adverse effects identified above.

*Local Actions*

Local governments will be faced with similar but more direct pressures from population growth and movement. There will be demands for intensified development in rural areas as well as increased demands for water, municipal infrastructure, and other resources. The reaction of local governments to such pressures is difficult to assess at this time. In the past, local governments in the action area generally accommodated additional growth in ways that adversely affected listed fish habitat. Also there is little consistency among local governments in dealing with land use and environmental issues, so any positive effects that local government actions have on listed species and their habitat are likely to be scattered throughout the action area.

In Washington, local governments are considering ordinances to address how different land uses affect fish and habitat health. These programs are part of state planning structures. Some local government programs may qualify for a limit under the NOAA Fisheries' ESA section 4(d) rule which is designed to conserve listed species. Local governments also may participate in regional watershed health programs, although political will and funding will determine participation and therefore the effect such actions have on listed species. Overall, without comprehensive and cohesive beneficial programs – and the sustained application of such programs – it is not likely that local actions will have measurable positive effects on listed species and their habitat, and may even contribute to further degradation.

*Tribal Actions*

Tribal governments will continue to participate in cooperative efforts involving watershed and basin planning designed to improve fish habitat. The result that changes in Tribal forest and agriculture practices, water resource allocations, and land uses will have on listed fish and their habitat are difficult to assess for the same reasons discussed above under State and Local Actions. The earlier discussions related to growth impacts also apply to Tribal government actions. Tribal governments will need to put into practice comprehensive and beneficial natural resource programs if they are to have measurable positive effects on listed species and their habitat.

*Private Actions*

The effects of private actions are the most uncertain. Private landowners may change, intensify, or diminish their current land uses. Individual landowners may voluntarily initiate actions to improve environmental conditions, or they may abandon or resist any improvement efforts. Their actions may be compelled by new laws, or may arise out of growth and economic pressures. Changes in ownership patterns will have unknown impacts. There is no way to predict whether any of these private actions will take place, and gauging their possible effects is even more difficult.

Non-Federal actions are likely to continue affecting listed species. The cumulative effects in the action area are difficult to analyze considering the geographic landscape of this opinion, the different resource authorities in the action area, the uncertainties associated with government and private actions, and the changing economies of the region. Whether these effects will increase or decrease is a matter of speculation; however, based on the trends identified in this section, the adverse cumulative effects are likely to increase. Although state, Tribal and local governments have developed plans and initiatives to benefit listed fish, they must be applied and sustained in a comprehensive way before NOAA Fisheries can consider them "reasonably foreseeable" in its analysis of cumulative effects.

## 7.0 Integration and Synthesis of Effects

NOAA Fisheries has proposed to amend modification 1 to section 10 permit #1094 to WDFW to include conditions to allow additional management measures for surplus hatchery fish to address the unusual circumstances in 2002. In the context of all the actions authorized in permit 1094, implementation of the artificial propagation programs provides a benefit to the conservation and recovery of the steelhead ESU, as discussed previously in this opinion. Permitting a limited harvest that manages surplus hatchery broodstock returns is consistent with the overall goals and objectives of the enhancement program. The conclusion in the original biological opinion (NMFS 1998a) was that the hatchery supplementation program provided a net benefit and would not jeopardize the steelhead ESU. The additional analysis by NOAA Fisheries in 2001 and in this reinitiation supports this conclusion, with the addition of a harvest as a management tool. The total incidental mortality of the four proposed actions is 23 natural origin steelhead. In the

context of the high return of 2002 (estimated to be over 19,000 steelhead above Priest Rapids Dam), the available spawning habitat, the potential positive effects of an increased natural origin to hatchery origin steelhead on the spawning grounds, the proposed actions would not adversely impact the productivity and population dynamics of the ESU even when the other sources of adult mortality (i.e., dam passage mortality, overwinter mortality) are considered.

## 8.0 Conclusion

After reviewing the current status of Upper Columbia River spring chinook and Upper Columbia River steelhead, the environmental baseline for the action area, the effects of the new measures proposed by WDFW, and the cumulative effects, it is NOAA Fisheries' conclusion that the amendment of section 10(a)(1)(A) permit 1094 to include conditions providing additional tools for broodstock management is not likely to jeopardize the continued existence of UCR steelhead ESU.

## 9.0 Incidental Take Statement

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibits the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the NOAA Fisheries to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering. Harass is defined by the USFWS as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The terms and conditions outlined in section II are non-discretionary; they must be undertaken by the action agency so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, in order for the exemption in section 7(o)(2) to apply. The action agencies have a continuing duty to regulate the activity covered in this incidental take statement. If the action agencies (1) fail to assume and implement the terms and conditions or (2) fail to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the

agencies must report the progress of the action and its impact on the species to NOAA Fisheries as specified in the incidental take statement (50 CFR 402.14(i)(3)).

An incidental take statement specifies the impact of any incidental taking of endangered or threatened species. It also provides reasonable and prudent measures that are necessary to minimize impacts and sets forth terms and conditions with which the action agency must comply in order to implement the reasonable and prudent measures.

### 9.1 Amount or Extent of Take Anticipated

The expected number of natural-origin steelhead anticipated to be taken in 2002 as a result of the measures in WDFW's permit is in the range of 380-460 fish. Most of the fish taken would be released unharmed; an estimated 19-23 adult natural origin steelhead would die as result of injuries associated with catch and release. Approximately, 3,305 listed hatchery fish surplus to broodstock and natural escapement needs would also be taken in 2002 in the recreational harvest and retained. No additional take is anticipated from the trapping and hauling of surplus hatchery steelhead to areas where listed species do not occur. The trapping of steelhead for this supplementation program has already been evaluated in the original Biological Opinion on the issuance of the permit. No impacts are expected as a result of monitoring and evaluation programs associated with the harvest.

### 9.2 Effect of the Take

In this opinion, NOAA Fisheries has determined that the level of anticipated take is not likely to jeopardize the continued existence of Upper Columbia River spring chinook or Upper Columbia River steelhead or result in the destruction or adverse modification of designated critical habitat.

### 9.3 Reasonable and Prudent Measures

NOAA Fisheries believes that the reasonable and prudent measure(s) described in the original Incidental Take Statement are necessary and appropriate to minimizing take of listed UCR steelhead, and therefore remain valid for this modification. In addition:

(1) NOAA Fisheries shall ensure that the use of recreational harvest to manage adult hatchery steelhead returns is conducted in a manner consistent with recovery goals and objectives.

### 9.4 Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the action agency must comply with terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary with respect to species listed

under the ESA. The terms and conditions described in the original Incidental Take Statement remain valid for this modification. In addition:

(1) In tributary areas fishing regulations shall include the use of only unscented artificial flies or lures with only one single barbless hook. The use of bait shall be prohibited and night closure shall be in effect.

(2) Creel surveys shall be conducted in each of the fishery area. Data from these surveys shall be summarized and provided to NOAA Fisheries staff monthly during the fishing season.

## 10.0 Reinitiation of ESA Consultation

This concludes formal consultation on NOAA Fisheries' amendment of section 10(a)(1)(B) permit #1094 to WDFW. As provided in 50 CFR 402.16, reinitiation of consultation is required where Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of take specified in the permit is exceeded, (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered, (3) the action is subsequently modified in a manner that causes an effect on the listed species or critical habitat that was not considered in the biological opinions, (4) a new species is listed or critical habitat is designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, NOAA Fisheries must immediately request reinitiation of consultation. Any court settlement that addresses harvest sharing in the Columbia River Basin and affects the terms of this permit may be considered as new information.

## 11.0 Magnuson-Stevens Act Essential Fish Habitat Consultation

"Essential fish habitat" (EFH) is defined in section 3 of the Magnuson-Stevens Act (MSA) as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." NOAA Fisheries interprets EFH to include aquatic areas and their associated physical, chemical and biological properties used by fish that are necessary to support a sustainable fishery and the contribution of the managed species to a healthy ecosystem.

The MSA and its implementing regulations at 50 CFR 600.920 require a Federal agency to consult with NOAA Fisheries before it authorizes, funds or carries out any action that may adversely effect EFH. The purpose of consultation is to develop a conservation recommendation(s) that addresses all reasonably foreseeable adverse effects to EFH. Further, the action agency must provide a detailed, written response to NOAA Fisheries within 30 days after receiving an EFH conservation recommendation. The response must include measures proposed by the agency to avoid, minimize, mitigate, or offset the impact of the activity on EFH. If the response is inconsistent with NOAA Fisheries' conservation recommendation the agency must explain its reasons for not following the recommendations.

Thus, one of the objectives of this consultation is to determine whether the proposed actions – the amendment of ESA section 10(a)(1)(A) permit #1094 – are likely to adversely affect EFH. If the proposed actions are likely to adversely affect EFH, conservation recommendations will be provided.

### 11.1 Identification of Essential Fish Habitat

The Pacific Fishery Management Council (PFMC) is one of eight Regional Fishery Management Councils established under the Magnuson-Stevens Act. The PFMC develops and carries out fisheries management plans for Pacific coast groundfish, coastal pelagic species, and salmon off the coasts of Washington, Oregon and California. Pursuant to the MSA, the PFMC has designated freshwater and marine EFH for chinook and coho salmon (PFMC 1999). For purposes of this consultation, freshwater EFH for salmon in Washington includes all streams, lakes, ponds, wetlands, and other water bodies currently or historically accessible to Pacific salmon, except upstream of the impassable dams. In the future, should subsequent analyses determine the habitat above any impassable dam is necessary for salmon conservation, the PFMC will modify the identification of Pacific salmon EFH (PFMC 1999). Marine EFH for Pacific salmon in Oregon and Washington includes all estuarine, nearshore and marine waters within the western boundary of the U.S. Exclusive Economic Zone (EEZ), 200 miles offshore. EFH for coastal pelagic species and for a composite of groundfish species includes all waters, substrates and associated biological communities from the mean higher high water line, the upriver extent of saltwater intrusion in river mouths, and along the coast extending westward to the boundary of the EEZ.

### 11.2 Proposed Action and Action Area

For this EFH consultation, the proposed action and action area are described in detail in the above ESA consultation. The action is the amendment of ESA section 10(a)(1)(A) permit #1094 for WDFW's steelhead supplementation program. The proposed action area is the Upper Columbia River basin and includes the area in the immediate vicinity of RSRF and the locations where adult steelhead are trapped (e.g., Wells Dam). A more detailed description and identification of EFH for salmon is found in Appendix A to Amendment 14 to the Pacific Coast Salmon Plan (PFMC 1999).

### 11.3 Effects of the Proposed Action

Based on information submitted by WDFW, NOAA Fisheries believes that the effects of this action on EFH are likely to be within the range of effects considered in the ESA portion of this consultation. Effects of the proposed action would be restricted to interference with migratory passage due to fishery timing and run time, no chinook salmon adults are expected to be affected bu the proposed amendment.

### 11.4 Conclusion

Using the best scientific information available and based on its ESA consultation above, as well as the foregoing EFH sections, NOAA Fisheries has determined that the proposed action is not likely to adversely affect EFH for Pacific salmon.

### 11.5 EFH Conservation Recommendation

Because this action has been determined not likely to affect EFH for Pacific salmon, no conservation recommendations have been developed, and no statutory response is required.

### 11.6 EFH Consultation Renewal

NOAA Fisheries must reinitiate EFH consultation if these actions are substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for the EFH conservation recommendations (50 CFR Section 600.920(k)).

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